MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2320
Gaithersburg, Maryland 20899-2320

SRM Number: 935a
MSDS Number: 935a
SRM Name: Crystalline Potassium Dichromate

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MSDS Coordinator: Mario Cellarosi
Telephone: 301-975-6776
FAX: 301-926-4751
E-mail: SRMMSDS@nist.gov

Emergency Telephone ChemTrec:
1-800-424-9300 (North America)
+1-703-527-3887 (International)

Description: Standard Reference Material (SRM) 935a is intended for use as a reference standard for the verification of the accuracy and linearity of the absorbance scale at the 235 nm, 257 nm, 313 nm, 345 nm, and 350 nm wavelengths of absorption spectrometers that can provide an effective bandpass of 1.6 nm or less. SRM 935a consists of 15 g of crystalline potassium dichromate of established purity.

Substance: **Potassium Dichromate**

Other Designations: **Potassium Dichromate** (dichromic acid; dipotassium salt; potassium bichromate; dipotassium dichromate; red potassium chromate; iopezite; dipotassium salt chromic acid)

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component:	**Potassium Dichromate**
CAS Number:	7778-50-9
EC Number (EINECS):	231-906-6
SRM Nominal Concentration (mass %):	100
EC Classification (assigned):	T+, N, Xn, Xi, Carcinogen Category 2, Mutagen Category 2.
EC Risk (R):	21, 25, 26, 37, 38, 41, 43, 46, 49, 50, 53
EC Safety (S):	45, 53, 60, 61

3. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0–4): Health = 4 Fire = 0 Reactivity = 1 Special Hazard: Oxidizer

Major Health Hazards: Highly toxic. Potentially fatal if swallowed. Can cause respiratory tract, skin, and eye irritation, allergic reactions, kidney damage, and is a cancer hazard in humans.

Physical Hazards: May ignite combustibles.

Potential Health Effects
Inhalation: Acute exposure of potassium dichromate can cause destruction to tissues of the mucous membranes and respiratory tract. May cause tracheobronchitis and pulmonary edema. Symptoms may include a cough, irritation, sore throat, chest pains, lightheadedness, headache, sinusitis, laryngitis, sneezing, difficulty breathing, loss of appetite, fever, and lung congestion. Chronic exposure may cause severe irritation, inflammation, ulcerations, and perforation of the nasal septum. Congestion, lung inflammation, emphysema, bronchitis, allergic reactions may also occur. Loss of sense of smell and taste, ear damage, blood disorders, kidney, liver, and nerve damage, and cancer.

Skin Contact: Acute skin contact may cause irritation and severe burn. Contact to broken skin may cause ulcers and absorption may cause nausea, vomiting, shock, coma, kidney necrosis, and death. Chronic exposure may cause severe irritation and sensitization dermatitis. Chronic absorption through damaged skin may cause symptoms similar to acute contact.

Eye Contact: Eye contact may cause irritation and corneal injury. Chronic exposure may produce conjunctivitis, lacrimation, and dark red bands around the cornea.

Ingestion: Ingestion may cause nausea, vomiting, vertigo, anuria, muscle cramps, convulsions, and coma. Death may result from blood loss into the gastrointestinal tract and other sites. Chronic exposure has caused stomach cancer from swallowing chromate dust or from excessive mouth breathing.

Listed as a Carcinogen/ Potential Carcinogen:

Yes	No	
X*		In the National Toxicology Program (NTP) Report on Carcinogens.
X*		In the International Agency for Research on Cancer (IARC) Monographs.
	X	By the Occupational Safety and Health Administration (OSHA).

*The NTP classifies potassium dichromate as a **Known Human Carcinogen**. The IARC classifies potassium dichromate as **Human Sufficient Evidence, Group 1.**

4. FIRST AID MEASURES

Inhalation: If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration by qualified personnel. Get immediate medical attention.

Skin Contact: Remove contaminated clothing and shoes. Wash skin with soap and water for at least 15 minutes. Obtain medical assistance, if needed.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain immediate medical assistance.

Ingestion: If ingestion occurs, drink plenty of water. **DO NOT INDUCE VOMITING.** Never give anything by mouth to an unconscious person. If vomiting occurs, keep head lower than hips to prevent aspiration. If a person is unconscious, turn head to side. Obtain immediate medical assistance.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Potassium dichromate is a negligible fire hazard. Potassium dichromate is an oxidizer. May ignite or explode on contact with combustible materials.

Extinguishing Media: Water. **DO NOT** use dry chemicals, carbon dioxide, or halogenated extinguishing agents.

Fire Fighting: **DO NOT** touch spilled material. Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Flash Point (°C): Not applicable.
Method Used: Not applicable.

Autoignition Temp. (°C): Not applicable.

Flammability Limits in Air
UPPER (Volume %): Not applicable.
LOWER (Volume %): Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: **DO NOT** touch spilled material. Wear appropriate personal protective equipment as specified in Section 8, "Exposure Controls and Personal Protection". Avoid contact with combustible or other readily oxidizable materials. Collect spilled material in appropriate container for disposal.

Reportable Quantity: Potassium dichromate is subject to reportable quantities (RQ) under Title III of SARA section 103. See Section 15, "Regulatory Information". U.S. Regulations (CERCLA) require reporting spills and releases in excess of reportable quantities. The reportable quantity for potassium dichromate, however, is greater than the unit quantity provided for SRM 935a.

Disposal: Refer to Section 13, "Disposal Considerations".

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection".

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: **Potassium Dichromate**

OSHA (PEL): 0.1 mg $(CrO_3)/m^3$ ceiling
ACGIH (TLV): 0.01 mg $(Cr)/m^3$ TWA (insoluble compounds)
ACGIH (TLV): 0.05 mg $(Cr)/m^3$ TWA (soluble compounds)
NIOSH: 0.001 mg $(Cr[VI])/m^3$ recommended TWA (10 h)
UK MEL: 0.05 mg $(Cr)/m^3$ TWA (hexavalent chromium compounds)

Ventilation: Use a local exhaust ventilation system. Ensure compliance with applicable exposure limits.

Respirator: For conditions of frequent use or heavy exposure where exposure is apparent and engineering controls are not feasible, respirator protection may be needed. Refer to the "NIOSH Guide to the Selection and Use of Particulate Respirators Certified under 42 CFR 84" for selection and use of respirators certified by NIOSH.

Eye Protection: Wear safety goggles. **DO NOT** wear contact lenses in the laboratory. An eye wash station should be readily available near areas of use.

Personal Protection: Wear appropriate protective clothing and chemically resistant gloves to prevent skin exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Component:	**Potassium Dichromate**
Appearance and Odor:	Red, crytals. Odorless.
Relative Molecular Weight:	294.2 g/mol
Molecular Formula:	$K_2Cr_2O_7$
Density:	2.69 g/cm^3
Water Solubility:	6.5 % @ 10 °C
Melting Point:	398 °C

10. STABILITY AND REACTIVITY

Stability: X Stable _____ Unstable

Stable under ordinary conditions of use and storage.

Conditions to Avoid: Avoid heat and contact with combustible materials.

Incompatible Materials: Potassium dichromate is incompatible with metals, combustible materials, reducing agents, amines, cyanides, and bases.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Thermal decomposition may produce chrome oxides.

Hazardous Polymerization: ____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: X Inhalation X Skin X Ingestion

Toxicity Data
Potassium Dichromate:
Man, Oral LD_{LO}: 143 mg/kg
Human, Inhalation TC_{LO}: 0.1 mg/m^3
Rat, Oral LD_{50}: 25 mg/kg
Rat, Intraperitoneal LD_{50}: 28 mg/kg
Rabbit, Skin LD_{50}: 14 mg/kg

Mutagenic, Tumorigenic, Reproductive Data: Potassium dichromate has been investigated as a tumorigenic, mutagenic, and reproductive effector.

Medical Conditions Aggravated by Exposure: Blood system, cardiovascular, liver, respiratory, and skin disorders. Allergies.

Health Effects (Acute and Chronic): See Section 3: "Hazards Identification" for potential health effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data
Fish Toxicity: Bluegill (Lepomis macrochirus) LC_{50} (mortality): 131 µg/L (96 h)
Invertebrate Toxicity: Water flea (Daphnia magna) EC_{50} (immobilization): 160 µg/L (48 h)
Algal Toxicity: Diatom (Skeletonema costatum) MATC (biochemical): 300 µg/L (72 h)
Phototoxicity: Duckweed (Lemna minor) (population growth): < 5.7 µg/L (7 h to 10 h)
Other Toxicity: Clawed toad (Xenopus laevis) (mortality): 350 µg/L (100 d)
Environmental Summary: Hightly toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations. Potassium dichromate is subject to disposal regulations U.S. EPA 40 CFR 262, Hazardous Waste Number D001, D007. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory Level of 5.0 mg/L.

14. TRANSPORTATION INFORMATION

U.S. DOTand IATA: Oxidizing solid, toxic, n.o.s. (Potassium Dichromate), UN Number 3087, Hazard Class 5.1, Packing Group II, Subsidiary Risk 6.1

15. REGULATORY INFORMATION

U.S. Regulations: CERCLA Sections 102a/103 (40 CFR 302.4):
Potassium Dichromate: 4.545 kg (10 lbs)

SARA Title III Sections 302 (40 CFR 355.30), 304 (40 CFR 355.40):
Not regulated.

SARA Title III Section 313 (40 CFR 372.65):
Chromium Compounds

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE:	Yes.
CHRONIC:	Yes.
FIRE:	Yes.
REACTIVE:	No.
SUDDEN RELEASE:	No.

OSHA Process Safety (29 CFR 1910.119): Not regulated.

California Proposition 65: Hexavalent chromium compounds are known to the state of California to cause cancer (1987).

CANADIAN Regulations: WHMIS Classification: Not determined.

EUROPEAN Regulations: EC Classification (assigned):

T+	Very Toxic
T	Toxic
Xn	Harmful
Xi	Irritant
	Sensitizing
N	Dangerous for the Environment
	Carcinogen Category 2
	Mutagen Category 2

Danger/Hazard Symbol:

T+	Toxic
N	Dangerous for the Environment

EC Risk and Safety Phrases:

R 21	Harmful in contact with skin.
R 25	Toxic if swallowed.
R 26	Very toxic by inhalation.
R 37/38	Irritation to respiratory system and skin.
R 41	Risk of serious damage to eyes.
R 43	May cause sensitization by skin contact.
R 46	May cause heritable genetic damage.
R 49	May cause cancer by inhalation.
R 50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S 45	In case of accident or if you feel unwell, seek medical advice immediately.
S 53	Avoid exposure – obtain special instruction before use.
S 60	This material and/or its container must by disposed of as hazardous waste.
S61	Avoid release to the environment.

National Inventory Status

U.S. Inventory (TSCA): Listed on inventory.

TSCA 12 (b) Export Notification: Potassium Dichromate. Cas No. 7778-50-9. Section 6.

16. OTHER INFORMATION

Sources: MDL Information Systems, Inc., MSDS *Potassium Dichromate,* 09 December 2004.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use as a guide in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.